CHAPTER 16. EVALUATING PART 121 AIR CARRIER PROGRAMS WITH SAFETY ATTRIBUTE INSPECTION AND ELEMENT PERFORMANCE INSPECTION DATA COLLECTION TOOLS

SECTION 1. BACKGROUND

1. GENERAL. This chapter describes the air transportation oversight system (ATOS), the system safety process, and provides an introduction to the safety attribute inspection (SAI) and element performance inspection (EPI) data collection tools (DCT) that are an integral part of the ATOS system.

3. OBJECTIVE. The objective of this section is to provide non-ATOS certificate management teams (CMT) and their principals with an overview of ATOS and an introduction to the 1.x SAIs and EPIs.

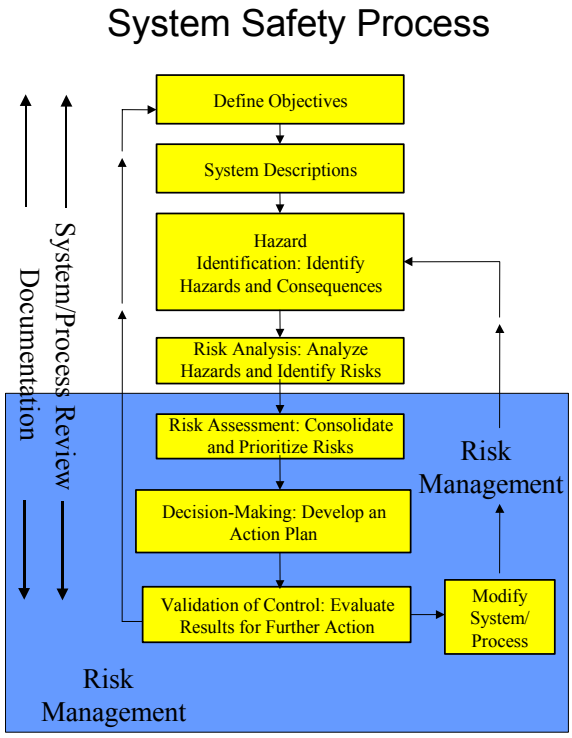
5. OVERVIEW. ATOS is the system by which the Federal Aviation Administration (FAA) provides regulatory oversight of air carriers that hold operations specifications issued in accordance with Title 14 of the Code of Federal Regulations (14 CFR) parts 119 and 121. The objective of ATOS is to ensure that the Flight Standards Service and air carriers meet their separate responsibilities in accordance with Title 49 of the United States Code (49 U.S.C.), 14 CFR, and FAA policy. Title 49 U.S.C. empowers the FAA to prescribe regulations and minimum safety standards and requires air carriers to provide service with the highest possible degree of safety in the public interest. ATOS has three primary functions: verification, validation, and risk management. Verification processes (e.g., initial certification and program approvals/acceptance) ensure that an air carrier meets regulatory requirements and safety standards. Validation processes (e.g., performance assessments) ensure that air carrier operating systems perform as intended by the regulations. Risk management processes deal with hazards and associated risks that are subject to regulatory control (e.g., enforcement, certificate amendment, rulemaking) and are used to target FAA resources in accordance with risk-based priorities. System safety is the underlying philosophy of ATOS and postulates that safety is an outcome of a properly designed system. ATOS accomplishes its verification, validation, and risk management activities by using tools that are structured in accordance with safety attributes derived from system engineering and quality concepts. These tools focus ATOS oversight on an air carrier's organization, particularly on the design and performance of processes that an air carrier employs to conduct its business, and on the impact of the operating environment. Safety is an outcome of an air carrier's management of its safety-critical processes. Air carriers, not the FAA, are responsible for safety management, quality assurance, and quality control. While ATOS must enable safety inspectors to make independent judgments, the system is also designed to support data sharing, collaboration, open communication, and voluntary programs such as internal evaluation and aviation safety action programs. Efficient use of resources is accomplished through risk targeting and clearly defined safety priorities.

7. THE AIR TRANSPORTATION OVERSIGHT SYSTEM (ATOS). ATOS is the system by which Flight Standards implements FAA policy. ATOS does this by providing safety controls (i.e., regulations and their application) of regulated business organizations and individuals. Through the application of regulations and policy, ATOS also ensures that an air carrier's operating systems are properly configured to control risk. The primary functions of ATOS are (1) verification—to ensure that air carriers meet required standards and to issue operating certificates and approve or accept air carrier programs after verifying that standards are met; (2) validation—to ensure continuing operational safety by assessing the performance of an air carrier's operating systems; and (3) risk management—to manage hazards and associated risks that are subject to regulatory control and to target FAA resources in accordance with risk-based priorities. Verification, validation and risk management are decision-making functions. In this context, ATOS is a decision support system. Decisions are the output of the system. ATOS data collection is a purposeful activity to support decision makers. The primary decision makers are principal inspectors.

9. ATOS CONCEPTS AND PRINCIPLES. ATOS relies on the following concepts and principles:

A. Definitions of Safety and Risk. Safety is not defined in statutory law (i.e., 49 U.S.C. § 44702) or in administrative law (i.e., 14 CFR). The dictionary defines safety as, "freedom from danger, risk, or injury." MIL-STD-882D, often used as a source of fundamental system safety information, defines safety in similar terms: "freedom from those conditions that can cause death, injury, damage to or loss of equipment or property, or damage to the environment." Similarly, dictionaries define "risk" essentially as the converse of safety—"[risk is] the possibility of suffering harm or loss." The U.S. Supreme Court, in a 1980 ruling involving occupational safety, stated that, "safe is not the equivalent of risk free." The court concluded, "Congress [in the case of the Occupational Safety and Health Act] was concerned, not with absolute safety, but with the elimination of significant harm." In this context, safety is equivalent to minimizing risk. It is reasonable to assume that the authors of 49 U.S.C. § 44702 had similar reasoning in mind when they delineated the duty of an air carrier to "provide service with the highest possible degree of safety." For this reason, the concept of risk provides a means to measure safety management efforts. Risk is an expression of the relative severity of hazard-related consequences and their likelihood of occurrence. Consequently, success in safety management and the "level of safety" achieved are measurable in terms of how well factors that influence the severity or likelihood of injurious or loss-producing events are eliminated or controlled.

B. System Safety. System safety is the philosophical underpinning of ATOS. As defined above, safety is managed by minimizing risk and is an outcome of properly designed systems. Properly designed systems control hazards by eliminating or mitigating associated risks before they result in accidents or incidents. As discussed above, air carriers have a statutory obligation to minimize risk through the design of their operating systems. These concepts provide the foundation for ATOS verification and validation processes.



C. The System Safety Process Model.

(1) An important part of system safety is to consider the system in a structured fashion. The System Safety Process Model above, if carefully applied, could provide such a structure. This structured review of an operation should identify "what" controls are needed to eliminate hazards associated with the operation or to mitigate them to an acceptable level.

(2) The concept of this process is universal and can be used by the CMT to develop, implement, and track oversight activities of an air carrier, or by the air carrier when it develops its policies and procedures necessary to conduct its day-to-day activities. Many of the policies and procedures required to be in the air carrier's manual are necessitated by regulation. These requirements came about by accumulating safety related information from all entities involved in air transportation. From the manufacturing of the aircraft to the analysis of the aviation accidents, we encounter failures but we learn from these failures and we try to ensure that these failures are eliminated or at least mitigated to an acceptable level. We (FAA) mitigate or control these risks with our rule making process when the need arises, and to ensure that the regulations are imparted equally and fairly, our policy makers set the standards with which the regulatory requirements must be met. These

requirements may be for procedures to return an aircraft to service or for initiating ground deicing operations. In these instances, the air carrier should apply this or a similar concept to ensure the policies and procedures it develops take into account its unique and rapidly changing environment.

D. Safety and Quality.

(1) Safety is typically defined on the basis of counting or classifying events where injuries or damage occurs. So defined, safety cannot be managed directly because the defining events are outcomes, rather than manageable processes. The key to safety lies in management of the quality of safety-critical processes. ATOS recognizes that this is a primary responsibility of an air carrier in meeting its statutory obligations. To evaluate air carrier operating system design (i.e., verification) and performance (i.e., validation), ATOS employs six safety attributes. The six attributes are:

- Procedures—documented methods to accomplish a process
- Controls—checks and restraints designed into a process to ensure a desired result
- Process measures—used to validate a process and identify problems or potential problems in order to correct them
- Interfaces—interactions between processes that must be managed in order to ensure desired outcomes
- Responsibility—a clearly identifiable, qualified, and knowledgeable person who is accountable for the quality of a process
- Authority—a clearly identifiable, qualified, and knowledgeable person who has the authority to set up and change a process.

(2) The FAA developed these attributes in consultation with system engineering and safety experts. The attributes provide a structure to the tools FAA inspectors use in conjunction with standardized processes for (1) initial certification of an air carrier, (2) approval or acceptance of an air carrier's operating systems when required to do so by the regulations, and (3) validation of an air carrier's operating systems for the purpose of continuing operational safety.

E. Focus on an Air Carrier's Organization and Processes. The traditional approach of issuing certificates, monitoring compliance, investigating noncompliance and administering sanctions for noncompliance does not, in and of itself, address process deficiencies that underlie unsafe situations. FAA oversight must also focus on an air carrier's organization and process management rather than on isolated vignettes of individual situations. This does not mean that FAA ignores individual situations, but rather that it interprets them as potentially symptomatic of organizational issues. Outputs and outcomes are still monitored, but the emphasis is on maintaining a safe process or correcting it when desired outcomes are not achieved. Assessments of process design and performance cannot be mere tabulations of anecdotal observations of deficiencies, but must address the quality of the process, and must be based upon objective evidence of adequacy that is representative of the process. The absence of negative observations cannot be regarded as a substitute for assertive evidence that the process is working as intended. Surveillance must supply objective evidence of both the adequacy and inadequacy of processes.

F. Open System Perspective. ATOS takes an open system perspective. An open system responds to feedback from its specific environment. A successful open system adapts itself to the needs of the environment and the resources in it. If the environment is complex and dynamic such as today's aviation environment, an air carrier's organization and systems must continually change to remain safe. Most hazards result from conditions that exist in an air carrier's operational environment. It is incumbent upon an air carrier to provide defenses against these hazards and to incorporate these defenses into its systems. Before being issued an operating certificate, an air carrier must demonstrate that it is capable of controlling known hazards and associated risks in its operating environment. However, hazards and risks are likely to change over time. An air carrier must continually adapt to these changes. Systems previously approved or accepted by the FAA that no longer relate to current environmental conditions must be re-evaluated. Surveillance tools should provide information on current environmental risks and on the organization's efforts to control them.

11. SAFETY ATTRIBUTE INSPECTIONS (SAI). SAIs support the verification process for the approval/acceptance of any of the following:

- Facility operations
- Air carrier operations
- Programs
- Documents
- Procedures or methods
- Systems

A. This generic process for approval/acceptance generally consists of five related "phases." The process can result in approving or not approving, or accepting or not accepting a proposal. A proposal could be the procedures for outsourcing maintenance included for review during the document compliance phase of a new certification, the submission of a new program by a certificated operator that does not presently have an approved program, or an existing carrier that has submitted a revision of an existing program to the CMO for review.

B. In phase three of the general approval process, and the document compliance phase of a new certification, the FAA evaluation is focused on the form, content, and technical quality of the submitted proposal to ensure that the information:

- Is not contrary to any applicable Federal Aviation Regulations
- Is not contrary to the direction provided in this handbook or other safety related documents
- Provides for safe operating practices by incorporating the six safety attributes

C. In addition to the general approval process and the certification process (see volume 1, chapters 3 and 4), other chapters of this order provide the specifics for the activity/program under review. Outsource Maintenance, volume 2, chapter 69, provides the technical detail one would look for when evaluating the air carrier's management and oversight of its maintenance providers.

13. ELEMENT PERFORMANCE INSPECTIONS (EPI).

A. EPIs support the validation process for the approval/acceptance of any of the following:

- Facility operations
- Air carrier operations
- Programs
- Documents
- Procedures or methods
- Systems

B. Phase four of the general process for the approval/acceptance of a program and the demonstration and inspection phase of a new certification require an operational evaluation of the operator's ability to function in accordance with the proposal evaluated in phase three or the document compliance phase. Usually these demonstrations are required by regulation. Some examples include training programs, emergency evacuation demonstration, external load class operational tests, and Non-Destructive Inspection (NDI) tests. EPIs provide a structured review, which should identify weaknesses in the air carrier's programs.

SECTION 2. PROCEDURES

1. OBJECTIVE. The objective of this section is to provide non-ATOS certificate management teams (CMT) and their principals a detailed description of the 1.x SAIs and EPIs, and general guidance for the use of these tools.

3. DOWN LOADING AND SAVING WORD VERSIONS OF 1.X SAIs AND EPIs. To ensure that the 1.x SAIs and EPIs you are working with are current, it is recommended that "copies" be obtained from the Web site http://fsims.avr.faa.gov/. You will be able to download word versions of the 1.x SAIs and EPIs with or without job task items (JTI). The elements are constantly being improved and may be revised during the time that the evaluation your CMT is working is taking place. For that reason it is recommended that a copy be downloaded from the Web site as recent as possible to the time of the evaluation/assessment and that copies be archived so that they become the desired version of the element for the duration of the evaluation.

5. DETAILED DESCRIPTION OF THE 1.X SAI. SAI data collection tools should be used as a reference by principal inspectors (PI) to ensure both regulatory compliance and inclusion of the safety attributes in air carrier programs. Future surveillance activities may be generated based upon the answers gathered with the questions of the SAI. An annotated version of the SAI can be archived and the results used to support risk statements and action plans.

A. Although 1.x SAIs were created to be part of a much larger oversight system, non-ATOS inspectors can benefit from the structured evaluation these tools produce. As stated above, the purpose of the 1.x SAI is to assist inspectors in ensuring regulatory compliance and that the safety attributes are addressed in the design of an air carrier's program. The questions in the procedures section identify the applicable regulatory requirements and the questions of the remaining sections, sections 2-5, ensure the inclusion of the other safety attributes. The following paragraphs describe the sections of the 1.x SAI:

(1) Element Summary Information: Every 1.x SAI has a Summary Information page that spells out what the "Purpose" and "Objective" are for the element, and any "Specific Instructions" that must be followed when performing an evaluation.

(2) Supplemental Information: Every 1.x SAI has a Supplemental Information section that lists the specific regulatory requirements (SRR) and FAA policy and guidance in a table format. The references that appear in this table are generated from the references attached to the questions in Section 1, Procedures Attribute, of the SAI.

(3) Section 1, Procedures: The element specific questions in Section 1, Procedures, of the 1.x SAI are generated from the specific regulatory requirements of 14 CFR part 121 and applicable FAA policy and guidance. If the ATOS element has associated guidance in volume 2 of this order, the chapter and paragraph will be referenced in a question in this section. Most ATOS airworthiness elements have one or more chapters in volume 2 of Order 8300.10, Airworthiness Inspector's Handbook that provide guidance for the evaluation/verification of a program.

B. In addition to the element specific questions, there are four standard questions that appear at the end of this section, numbered 2-5. These questions were generated from 14 CFR part 121, § 121.135. These questions ask for policy, duties and responsibilities, procedures, and work instructions necessary to accomplish the work associated with the air carrier's programs. These questions should be answered after all of the regulatory requirements have been addressed in the element specific questions in this section and should ensure that any additional duties, responsibilities, procedures, or instructions are in place necessitated by the uniqueness of the certificate holder's operation.

C. The questions in section 1 may have JTIs listed with them. These JTIs further identify the regulatory or policy requirements associated with the question to which they are attached. Not all questions require JTIs.

D. In addition to JTIs, the questions in Section 1 identify ATOS element interfaces that may be applicable. In addition to answering the element specific questions in Section 1, think about what groups of air carrier personnel must interact. A question may require procedures for maintenance personnel to notify maintenance control of a repair action that will restrict an aircraft operationally. This information must make it to the cockpit so that the crew operating the aircraft are fully informed of the limitation and that all necessary actions have taken place. Considering the unique operation of the air carrier, do the procedures and interfaces appear to be thought out and

reasonable to ensure a timely flow of information? Keep a running tab of the questions answered in section 1, that you feel may have interface issues or concerns. Document these concerns with question 1, in section 4. This question asks if the appropriate interfaces are identified for the requirements identified by the questions of section 1, and this is where to document the interface issues identified. Negative findings should be documented in PTRS and addressed as appropriate as a part of or with an individual risk management action plan specifying future surveillance activities.

(1) Section 2, Controls. The questions in this section are linked to the questions that appear on the corresponding EPI for the element. Question 1.1 in the Controls Section asks if controls exists for the performance measure asked about in section 1 of the EPI, question 1.1. For each performance question on the EPI there will be an associated question in this section of the SAI. Negative findings should be documented in PTRS and addressed as appropriate as a part of or with an individual risk management action plan specifying future surveillance activities.

(2) Section 3, Process Measurements. The questions in this section are linked to the questions that appear on the corresponding EPI for the element. Question 1.1 in the process measurement section will be asking if process measurements exists for the performance measure asked about in Section 1 of the EPI, question 1.1. For each performance question on the EPI there will be an associated question in this section of the SAI. Negative findings should be documented in PTRS and addressed as appropriate as a part of or with an individual risk management action plan specifying future surveillance activities.

(3) Section 4, Interfaces. There are two questions in this section. The first question asks if the appropriate interfaces exist for the requirements identified by the questions in the procedures section of the SAI. And the second question asks does the certificate holder's manual document a method for assessing the impact of any changes to the associated interfaces within the process. This section is generic to all 1.x SAIs.

(4) Section 5, Management Responsibility and Authority. There are nine questions in this section that ask if the responsibility and authority attributes are defined and assigned. The questions in this section should be answered if the EPI is being accomplished in support of an initial certification activity. For existing air carriers, principals should utilize the section if there are personnel changes and/or should significant changes to the air carrier's operation.

(5) SAI Drop Down Menus. Each section of the SAI has a unique drop down menu that allows for the commenter to categorize their negative findings. The primary purpose for this is to provide a high level sort of the collected information when inspectors report their findings in the ATOS repository. Non-ATOS CMT members may benefit from reviewing the drop down menus prior to answering the questions of the associated sections and if there are negative findings, the comment included in the PTRS report for the observation should indicate which selection was applicable. For the most part the selections on each menu are straight forward and do not require explanation. However, the drop down menu for Section 3, Controls Attribute, has a selection that might be misleading. Selection 5 states, "Controls could be unenforceable." In this instance, unenforceable means that management does not ensure controls are followed, not that the failure to comply would necessitate an enforcement action.

7. DETAILED DESCRIPTION OF THE 1.X EPI. EPIs are the ATOS inspections that determine if an air carrier follows its written procedures and controls, and meets the established performance measures for each system element. EPIs are planned for and executed at the element level and done by individual inspectors. EPIs support the validation function of program approval/acceptance and the demonstration phase of an initial certification. The tool has two sections, Performance Observables and Management Responsibility and Authority Observables.

A. Section 1, Performance Observables. This section of the tool looks at the output of the carrier's program to determine the effectiveness of the program in producing the desired output. There are two types of questions in this section, element specific and the standard questions numbered 2-6. The element specific questions are the performance measures that were established for the element and in most cases are derived from a regulatory requirement. For those elements that have guidance in volume 3 of the 8300.10 handbook, the performance measures questions should address the performance requirements of the associated handbook chapter. Since you are testing the effectiveness of a program, plan your activities so that you may observe the most critical and

most likely to fail areas first. If the SAI was accomplished, review any no responses to the controls and process measurements section questions, sections 2 and 3, and review the Interface section, section 4, to determine if any concerns were documented. Plan inspection activities so that these concerns can be answered.

B. Section 2, Management Responsibility and Authority Observables. This section will allow a CMT to document the person(s) with the authority to change a program and the person(s) responsible for the accomplishment of the program. This information can be useful in determining the impact of key personnel changes at an air carrier. This section should be assigned at the discretion of the principal and specific instructions should be provided to the assigned inspector as to whom or where (corporate, main base, line station) the questions should be directed.

C. EPI Drop Down Menus. Each section of the EPI has a unique drop down menu. The sections of the SAI are analogous to the selections of the section 1 drop down menu in providing a structured review of an air carrier's operation. Non-ATOS inspectors using the 1.x EPI should review the selections of the section 1 drop down menu prior to accomplishing the observations necessary to accomplish the validation function. The drop down is constructed from the components of, and the safety attributes of, a good system. Should failures occur during the performance assessment, most likely it will be attributed to at least one of these selections. Dependant upon the information gathered, principals may choose to modify their risk action plans accordingly.

9. SAI/EPI RESPONSE OPTIONS. There are three response options available to ATOS inspectors accomplishing SAI and EPI activities, "Yes," "No," or "N/A." If a question has the "N/A" response option, it indicates that the regulatory requirement is type specific, equipment specific, or that the regulation allows for an alternate means of compliance. Determine if the question applies and only answer the question once if it is not applicable. EPI Section 1 questions that have an "N/A" response option will also have the "N/A" response option for the associated controls and process measurements questions in the corresponding 1.x SAI. Supporting information may be captured as a comment, non-ATOS inspectors may add text to the questions of the word version of the element you are working and this annotated record should be saved/archived.

11. "YES" ANSWERS TO THE SAI QUESTIONS. Knowing where to find the information contained in an applicant/certificate holder's manual system is half the battle. When answering the questions, a comment should be made to include the location of the information in the applicant/certificate holder's manual in the word document that will be archived at the end of the evaluation. This information will be helpful in researching and planning future activities, and will be invaluable should there be changes to the CMT personnel/principals. This information should reduce the amount of time it takes new personnel assigned to the certificate to get acquainted with the air carrier's policies and procedures.

13. WHAT TO DO WITH "NO" ANSWERS GATHERED WITH 1.X SAIs. The 1.x SAI will assist you in determining if the technical content of a program is adequate, but it stops short of seeing the actual program in operation. The EPI is intended to perform that function. That does not mean that the 1.x SAI will not identify or provide information that could be used to identify risks with an applicant's/certificate holder's program. For risk assessment purposes, "No" answers in the procedures section can be more significant than "No" answers in the remaining sections. When conducting a manual review with a 1.x SAI, "No" responses to the element specific questions in the procedures section will indicate that the applicant's/certificate holder's manual content does not meet or is contrary to the regulatory requirements for a given element. While "No" answers in the remaining sections provide more useful information for determining surveillance requirements or inspection activities. "No" answers to a question in sections 2-5 might be used to formulate tabletop and or proving flight scenarios to test the effectiveness of the air carrier's procedures. If the air carrier is an existing carrier requesting approval for a program change, the same holds true except that surveillance of the ongoing operation will have to be used in lieu of table top and proving runs to test the effectiveness of the requested change. This is the hand off from the verification function to the validation function, and EPI activities will be focused on the risks identified during the manual review.

15. WHAT TO DO WITH "NO" ANSWERS COLLECTED WITH 1.X EPIs. No answers have to be evaluated to determine if the information they provide identify weaknesses in the performance of the air carrier's program, or the air carrier's program design. The drop down menu for section 1, selections will identify if the negative observations were attributed to a lack of resources

(Personnel, Tools and Equipment, Technical Data, Materials, Facilities) or a design issue (Policies, procedures, instructions or information, Controls, Process Measurements, Interfaces). Negative findings should be documented in PTRS and addressed as appropriate as a part of or with an individual risk management action plan specifying future surveillance activities.

17. TARGETING ACTIVITY. The negative responses collected with the 1.x SAI's and EPIs should be used to initiate action plans. Action plans should be developed in accordance with ATOS or SEP guidance, as appropriate, with focused surveillance and certificate management activities that directly address the issues found.

19. PTRS. Non-ATOS inspectors should use the PTRS record as the official document of negative findings discovered with the accomplishment of the 1.x SAIs and EPIs. However, it is recommended that the word document without JTIs by downloaded and annotated with both positive and negative comments, with the negative comments imported into a PTRS record.

21. CONTINUOUS MONITORING. The process of risk management is continuous. The certificate holder must continuously update its programs and allocate its resources and activities to meet changes in its operating environment. Principal airworthiness inspectors must emphasize this continuing responsibility to air carrier management personnel.